

Issue Paper

RAND

National Defense Research Institute

20000223 180

Transforming U.S. Forces Lessons from the Wider Revolution

David C. Gompert, Irving Lachow

INTRODUCTION

The so-called revolution in military affairs (RMA) is primarily an information revolution. Therefore, while it is helpful to learn from previous discontinuities in warfare—such as those brought on by aviation and by fast armor—it is just as important to draw lessons from the revolution in nonmilitary affairs being propelled by information technology. This paper does that by sifting through commercial experiences of the last two decades and then suggesting principles and measures that might help the U.S. defense establishment transform U.S. military capabilities in order better to exploit the technology that is changing the world.

This is far from the first attempt to inject corporate success into the world of defense. In recent years, various reengineering plans, best practices, “revolutions in business affairs,” procurement reforms, and Department of Defense (DoD)-wide information systems have been introduced, with admirable results. Yet, while the U.S. defense establishment has become more efficient in a narrow sense, it increasingly seems unable to transform its output—U.S. military capabilities, doctrine, and structure—even though it has declared its resolve to do so.¹ Therefore, we are especially on the lookout for ideas on how to effect corporate change for the sake of making operational and strategic gains.²

¹See *Report of the Quadrennial Defense Review*, May 1997, and *Joint Vision 2010*.

²RAND has published a number of other reports that examine new analytical frameworks and decision processes with the goal of transforming U.S. forces. See, for example, Paul K. Davis, James H. Bigelow, and

THE MILITARY INFORMATION REVOLUTION

The General Revolution

Although both digital communications and computing are decades old, the information revolution began in earnest only when the two met. The development of the Ethernet and the deregulation of U.S. telecommunications sparked a veritable “big bang” of data networking around 1980. At the same time, advances in microelectronics led to dramatic gains in processing speed and transmission capacity, stoking the fires of revolution.

Data networking has emancipated information from the slavery of location. By freeing, utilizing, and rewarding brain power, networking mobilizes the intelligence of the *many* at the expense of control by the *few*. Consequently, the brilliance of leadership is measured increasingly by its ability to liberate the genius of the rank and file and to inspire that genius with a vision. Such developments are not so much imposed or determined by technology as they are natural progress enabled by it. Organizations of all sorts can now capitalize on their employees’ talents, reduce vertical control, and respond better to their external environments. Reformed, they become more productive.

The information revolution and its ripple effects have created a world of change and uncertainty. The future is

Jimmie McEver, *Analytical Methods for Studies and Experiments on “Transforming the Force,”* DB-278-OSD (Santa Monica: RAND, 1999), and Paul K. Davis, David C. Gompert, Richard J. Hillestad, and Stuart Johnson, *Transforming the Force: Suggestions for DoD Strategy*, IP-179 (Santa Monica: RAND, 1998).

RAND issue papers explore topics of interest to the policymaking community. Although issue papers are formally reviewed, authors have substantial latitude to express provocative views without doing full justice to other perspectives. The views and conclusions expressed in issue papers are those of the authors and do not necessarily represent those of RAND or its research sponsors. © Copyright RAND 2000.

DISTRIBUTION STATEMENT A
Approved for Public Release

DTIC QUALITY INSPECTED 1

unlikely to resemble the past. Therefore, forecasting the future from the past can be misleading, and operating on the basis of past success can be hazardous. Only organizations bold enough to transform themselves—to ride the revolution—can proceed with confidence.

The Military's Opportunity

The gathering RMA is no different in kind from the general information revolution. Information technology allows military forces to gain superior knowledge of the battle and to operate in networks with unprecedented effects. Instead of concentrating forces to gain advantage, data sharing allows them to be scattered for advantage. While it has been long understood that dispersing forces can enhance their survivability, recent analysis and experience also point to an opportunity for improvement in their ability to outmaneuver and destroy enemy forces.³ In war's logic, networked forces can be more "productive."

With data networking, dispersed forces can operate as seamlessly as massed forces can. Better than massed forces, they can support one another in any combination, provided that command and control (C2) procedures keep pace. Although evolving C2 doctrine has yet to capitalize fully on the potency of networked forces, it is already clear that decentralizing tactical decisionmaking can improve the ability of forces to adjust to the threats and opportunities of a fluid battle. In the extreme, by converting distance from a drawback into an advantage, information technology can keep enemy forces in the crosshairs of violence and one's own forces far from it.⁴

Obviously, there are profound differences between the military and other sectors. Lacking an analog of profit (or expected future profit), the military cannot gauge value or progress with ease and precision. Judgments affecting war and peace cannot be delegated cavalierly, much less automated, for the sake of battlefield agility. War's destructiveness creates a dynamic that is absent from even the most competitive markets. Finally, military order and discipline, which are still essential, limit the freedom of commanders to "let go" as their corporate cousins can.

Still, this particular RMA resembles the general information revolution in the nature of the opportunities it

affords: to improve performance by networking knowledge; to distribute capabilities optimally, unbound by distance; and to eliminate layers, interference, and delay. Whether in military or nonmilitary affairs, networking improves the execution of necessarily centralized functions while decentralizing other functions formerly performed by "middle management." Leaders are able to concentrate on their specialty: strategy. Networking thus creates synergy between lower-level initiative and top-level responsibility.

The RMA and other information revolutions also share a need for organizational and operational changes in order to seize this opportunity to perform better. Yet the incentive to change is bound to be strongest for institutions whose fate hangs in the balance, and thus could be weak for the U.S. military establishment, which is unrivaled and has lately known nothing but success on the battlefield. There is precedent for corporate transformation even in the absence of clear and present danger, but it requires a special sort of leadership.

WHY AND HOW ORGANIZATIONS TRANSFORM THEMSELVES

Exploiting Network Economies

Unlike ordinary commodities, information is more valuable the more abundant it is.⁵ The more nodes—and brains—that can generate, process, and use information, the stronger is the system as a whole. (True, there is a danger of "information overload."⁶ However, this phenomenon is not a consequence of networking but a symptom of the failure of network managers and users to organize information so that knowledge can be efficiently gained from it.) Such network effects pervade the information revolution, from the vibrancy of the firm that seeks the ideas of its employees and customers, to the robustness of distributed data processing, to the possibility of market dominance à la Microsoft.

When telecommunications carried only voice and computers were seen as huge calculators, the strategic advantage of distributing information was neither apparent nor practically exploitable.⁷ Organizations configured and used computing power hierarchically—in the same

³Soviet military thinkers are often credited with being the first to appreciate the advantage of being able to concentrate fire from maneuvering forces, but they lacked the information systems to do so.

⁴That said, even information technology cannot ensure an "empty battlefield," since ground forces—dispersed, of course—can make a friendly standoff strike all the more potent.

⁵Kevin Kelly, "New Rules for the New Economy," *Wired*, September 1997, pp. 140–143, 186–197.

⁶Reportedly, this was a problem in the Kosovo operation, where only a fraction of the information in the entire command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) system could be used by operating forces.

⁷The computational advantages of parallel and distributed processing were recognized earlier, but the lack of adequate bandwidth made widespread use infeasible.

way they worked. Firms relied on "automatic data processing"—a quaint activity one step up from manual data processing, good for back-office number-crunching.⁸

But as data networking became an affordable reality, many organizations came to see that it could solve operational problems and yield strategic advantages. It dawned on them that the new technology was good not just for performing computations but for manipulating, expanding, and using knowledge. So great was the potential of data networking that organizations began to overhaul the way they worked for the sake of tapping it. Those with a need to change now had the means to do so.

The Compelling Need to Transform

By the 1980s, many corporations had just such a need. Some were watching their market shares and profit margins shrink because of global competition and oppressive cost structures. Others understood that globalization—taking advantage of foreign markets, resources, and human capital—required a fundamental change in the way information was distributed and used.

Information technology offered such organizations the opportunity to become more productive, more intelligent, and more adaptable:

- *More productive* because collaboration among value-producing units could be strengthened, and every unit from top to bottom could focus on what it did best
- *More intelligent* because better-informed human talent, wherever located, could be empowered to decide, act, and even advise management
- *More adaptable* because information about customers, suppliers, and competitors could be acquired and processed faster and better.

In business terms, data networking lowered costs, improved customer satisfaction, and motivated employees, which in turn offered expanded market share, earnings growth, and organizational vigor.

The catch with information technology, however, is that such benefits are available only to those organizations prepared to change in form and philosophy—to strengthen horizontal structures and processes, to respond to market signals rather than to push products, and to redefine

leadership. Such changes cut across the grain of habit, especially of behavior reinforced by past success.⁹ So they are most likely to be made when the dire future consequences of sticking with the status quo are painfully clear.

Three Conditions of Change

It is one thing to understand that big structural and operational changes are needed in order to exploit information technology strategically and quite another to make them. Somehow—it varies from sector to sector, case to case—the forces of change must gain the upper hand over established structures, interests, and practices. An examination of the private sector suggests that three conditions are especially important for this to occur:

- An outside-in, solution-driven reorientation
- Dependence on employees' talent and initiative (not just on their labor)
- Relentless but trustful leadership.

Each condition reinforces the others, and all three are necessary. No large organization will shift to an outside-in perspective or act on its employees' ideas if it is dominated by or dependent on top management. Solutions to outside challenges are less likely to come from headquarters than from folks on the front line. And management is more likely to trust employees who have the knowledge to act responsibly on their own.

Reorientation—Toward Solutions

Before the latest information revolution, organizations used information, at best, as a tool of management. At worst, they hoarded it as an instrument of control. Important information was stamped "sensitive" or "proprietary" and guarded and manipulated in hopes of affecting both internal and external actors. Now, in contrast, the velocity of change and the ubiquity of information technology place a premium on gathering information from outside and sharing it throughout the organization. The strongest corporations are those that have switched from closed to open—from an inside-out to an outside-in drive train.¹⁰

This shift has strengthened the hand of end-users. The smartest providers of information products and services—typically, the ones who seek and heed the good ideas of

⁸The tendency to appliqué information technology over traditional ways of operating is also evident in the military. Although the Army's "digitized battlefield" has a lot more data flying around than the traditional battlefield, its basic structure is the same.

⁹See Clayton Christensen, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* (Cambridge, Mass.: Harvard Business School Press, 1997).

¹⁰Of course, a corporation can be very open to external signals and still pursue a "closed" market and technology strategy by drawing customers into proprietary solutions from which they cannot escape.

their own employees—understand that markets demand solutions, not products that are only good on their own terms. Of course, providers necessarily specialize in the efficient production of their particular goods and services. Yet, because of the strategic importance of information technology, especially of data networking, the stuff made by providers has to be converted, combined, and fit into solutions that users require.

To meet user needs, systems integration—which, incidentally, first appeared in the prerevolution military market—has become key to the strategic use of information technology.¹¹ Systems integration has two linked functions: translating users' operational problems into technically specified solutions and orchestrating an ensemble of information products and services needed to satisfy those specifications. The solutions provided by information systems integrators combine software engineering and user-driven systems analysis (marketing, in the classical sense). Whether performed by independent or in-house systems integrators, the process is outside-in.

The revolutionary significance of systems integration is not its ability to create technically complex systems per se, but its dedication to enabling users to improve their performance. This shift to a user orientation has not been limited to systems integrators and information technology providers. It is also evident in the growth of e-commerce, which is driven by customer convenience as much as by product differentiation. The Internet is making it possible for businesses of all sorts to succeed by exchanging instead of controlling information.

In the information age, failure to reorient from inside-out to outside-in can be life-threatening, as IBM learned. Even after the technical and regulatory barriers between computing and communications were knocked down, mainframe computers remained Big Blue's flagship product. After all, that's what IBM made—and what made IBM successful. The firm was too used to pushing what *had* worked to learn what *would* work; namely, that users' needs could be better met by distributed processing than by central processing. Or, to be more forgiving, IBM helped its customers on the margin, but not in making performance breakthroughs. Sure enough, IBM's revenue growth slumped, margins declined, and fixed costs became crushing. The world's top computer company nearly became a casualty of the information revolution. In the nick of time, IBM started to honor its own official

credo—address customer needs—and its performance has since improved steadily.

In contrast to IBM, Dell Computer Corporation quickly grasped the advantage of elevating the role of users in its business. Via the World Wide Web, Dell customers, large and small, can mold the computer they want and the price they will pay. This has made Dell number one in on-line sales of personal computers. Indeed, by organizing itself to respond to external forces, it has become the personal computer market leader. Dell's outside-in orientation reaches deeply into its business: By building computers to order, Dell does not need large inventories of finished systems and can order components as needed, thus reducing costs and improving asset management while still enjoying economies of scale.

The IBM-Dell comparison illustrates the importance of being adaptable. An organization's ability to sense subtleties and shifts in the external environment is crucial to performance, and such sensory acuity is best attained by distributing information and authority to act.¹² Generally speaking, information is best gleaned and processed by those in touch with the environment. This is important both tactically, in interpreting and answering current environmental signals, and strategically, in detecting, adjusting to, and alerting others in the system to environmental shifts.

User-driven corporations will continuously change products, goals, structures, business models, personnel policies, and strategies—everything except core values. In the words of Amazon.com's CEO, "In this new model, strategic direction is not formed by an insular group of top executives, but by the company's leading customers. It's an outside-in approach, as opposed to an inside-out. The customer is the strategy."¹³ In other words, extreme sensitivity to user needs can be a winning strategy in the information age. Organizations with an outside-in drive train not only excel under given conditions but also have a strong competitive advantage under fluid ones, and are thus more robust.

Tapping the Talent of the Ranks

Generally speaking, pre-information revolution workers got only the information they needed to perform delineated duties. After all, nothing more was expected of them. Management did little to nurture and draw on their talents

¹¹Predictably, defense prime contractors (e.g., Martin Marietta), aerospace firms (e.g., Boeing), and information technology companies (e.g., IBM and AT&T) raced toward this critical commercial niche, where they encountered pure systems integrators (e.g., EDS and CSC).

¹²The Santa Fe Institute has developed theories based on complex biological systems that suggest that decentralized organizations are more adaptable and successful than centralized ones.

¹³"The Corporation of the Future," *Business Week Online*, August 31, 1998 (subscriber URL: <http://www.businessweek.com/search.htm>).

to improve the business, determine what products should be made, or adjust to external opportunities and challenges. Such organizations were thus both inside-out and top-down—a tolerable combination before the information revolution, but one that is no longer viable.

The information revolution has increased the quantity and quality of information available to and shared among employees, thus enhancing their performance and enlivening their interest in their firms. Workers are becoming less reliant on chains of command for direction and are ready to trade paternalism for freedom. When management depends more on employees, and employees less on management, the results can be impressive:

- Jack Welch, the CEO of General Electric, has killed the idea of doing things “the GE way” in favor of a “boundaryless learning culture” in which ideas are valued regardless of their source. The result is arguably the strongest company in the world.¹⁴
- A GE jet engine plant in North Carolina has a single manager and 170 cross-trained employees organized into production teams that make their own decisions and are not clocked. This plant produces more engines with fewer defects at less cost than any other GE jet engine plant.¹⁵
- At Texas Instruments, managers around the world were asked to devise, share (via the Internet), and apply new ways to improve the business. The resultant increase in productivity enabled the firm to hike output and thus avoid building two chip plants that would have cost \$2 billion.¹⁶
- 3M, a pioneer of innovation, has its employees spend 15 percent of their time on personal projects as opposed to assigned ones. The creativity thus unleashed explains why 25 percent of the revenue of every 3M business unit comes from new products.¹⁷

Even with abundant information, talented people are not going to flourish in an organization where their function is merely to move product or please management. They will thrive on access to information only if they are also given the latitude, encouragement, and incentive to act upon it. So entrusted, they will create their own information channels inside and outside the company: “Pioneering companies not only put employees in charge of

their own knowledge but their knowledge connections. Freed of institutional constraints, individuals can make the connections that make the most sense.”¹⁸

Such a climate is not merely an end-state permitted by information technology but a stimulus for constant improvement. Again, take GE: Consistent with their financial commitments, managers of diverse business units are now free to experiment and tailor their organizations, products, and processes in response to the needs and forces of their particular markets. GE itself acts as a clearinghouse for successful new ideas from one part of its far-flung corporation to others, not only by providing for the transmission of information but also by creating an open culture and structure. The system as a whole can thus adapt for the better, thanks to the genius of its diverse but interconnected parts.¹⁹

Corporations of all sorts and sizes are now using teams that cut across organizational boundaries to effect change and improve performance. A striking example is Monarch Marking Systems, which in 1995 created such teams to overcome “appalling” stove-piping.²⁰ Monarch quickly doubled productivity, reduced past-due shipments by 90 percent, and reduced square footage for product assembly by 70 percent (which increased space and resources for new products). Management set three simple team rules: Participation is mandatory; teams define and solve problems with metrics and analysis (i.e., data and knowledge); and teams implement their solutions *before* checking with management. The third rule is especially illuminating: It suggests that management has enough trust in a well-informed team of employees to back whatever they come up with, *ex ante*. This says as much about the leaders of Monarch as it does about their employees.

Leadership—To Motivate, Liberate, and Navigate

Tapping talent and creating an outside-in orientation require a new sort of leadership. Before the information revolution, impetus for action typically came from the top. Without decisive commanders, top-down organizations were paralyzed because employees were unable to take initiative. This leadership model is unsuitable now that value is created by the spread of information. It can even be dysfunctional in times, such as ours, when change is so swift and unpredictable that the leaders in control are often clueless. A handful of people, however intelligent,

¹⁴“How Jack Welch Runs GE,” *Business Week Online*, June 8, 1998.

¹⁵“Engines of Democracy” *Fast Company*, October 1999, pp. 174–202.

¹⁶“Taming the Info Monster,” *Business Week Online*, June 22, 1998.

¹⁷James C. Collins and Jerry I. Porras, *Built to Last* (New York: HarperBusiness, 1994), p. 156.

¹⁸Thomas Petzinger Jr., *The New Pioneers: The Men and Women Who Are Transforming the Workplace and Marketplace* (New York: Simon & Schuster, 1999), p. 153.

¹⁹“How Jack Welch Runs GE.”

²⁰This example is taken from *The New Pioneers*, pp. 158–162.

cannot absorb and process enough information to make consistently sound judgments and fine adjustments in highly dynamic and fluid markets.

The new leadership cultivates and leverages knowledge residing throughout the organization. Leadership in networked organizations is about creating conditions conducive to success, not directing action. As the CEO of Southwest Airlines puts it: "I've never had control, and I never wanted it. If you create an environment where people truly participate, you don't need control. They know what needs to be done and they do it."²¹ Trusting the rank and file also frees up time for a more strategic orientation by CEOs who otherwise would be consumed by daily details.²²

General Electric's Jack Welch is the archetype of successful, flexible leadership in a constantly adapting organization. When he took over the reins of GE in 1981, "Neutron Jack" was the mover and shaker of the entire corporation. While there is still no doubt about who is in charge at GE, the nature of his leadership, and of GE, has changed significantly. Rather than planning and controlling the operations of every GE division from corporate headquarters, Welch sets performance targets and lets each business unit run itself. He exudes faith in his employees, and he sees to it personally that they are well trained.²³

Effective leaders will take drastic organizational steps to improve responsiveness. This is what David Pottruck, co-CEO of Charles Schwab Inc., did in 1995 when he saw the Internet's potential. In order to take advantage of that opportunity, he formed a separate on-line business unit that competed with Schwab's traditional brokerage divisions. By creating a business dedicated to Internet transactions, he enabled Schwab to compete in a radically different way while still allowing the company to provide its standard product. Though seen at the time as a threat to Schwab's core, this move positioned the company as the leader in on-line financial services. Schwab now handles 40 percent of all on-line financial transaction accounts in the world.²⁴

Untried ideas and new ventures are bureaucratic underdogs. Therefore, a leader can play an indispensable role in articulating and defending the need to transform, to remain adaptable, and to take chances. In Schwab's case, the need was to be first out of the starting blocks in the

Internet race. At GE, it was and is to be a leader in every one of its markets, however much they change. For Amazon.com, it is to enable nearly anyone anywhere to locate and buy nearly anything.

Because change can determine success or failure for the organization as a whole, the leader cannot be patient. Yet, there is a fine line between calling for change and trying to control it, and it takes a special leader to walk that line: "Managers can guide self-organization, but can't control it. Control turns self-organization into mere organization, a dynamic process into a static condition."²⁵ The leader's responsibility is to foster an organization's ability to learn and to translate that learning into action.²⁶ Paradoxically, the leader must be prepared to move heaven and earth so that the organization will reduce its obedience to him or her in favor of obedience to users' needs.

LESSONS FOR THE MILITARY INFORMATION REVOLUTION

At the Edge of Transformation

Granted, the military is not a business. So a supply of salt should be handy when applying notions about the wider information revolution to the military domain. That said, the *why's* and *how's* of transformation have been evident across a wide variety of human enterprises in a relatively short period of time (less than 20 years). Organizations private and public, great and modest, complex and simple, American and non-American, new and old, are changing for the purpose of, or as a consequence of, exploiting information technology. There is no inherent reason why the defense establishment should be exempt. Indeed, the fact that a military information revolution is already under way, however haltingly, suggests that the same basic motivations and dynamics are at work.

The most elementary prescription for military transformation is that drawing up a detailed blueprint is, at best, a waste of time. There will be no end-state and can be no static plan. The only constant should be a resolve to exploit information technology for national defense, because there is no better way—maybe no other way—to assure that U.S. forces can defeat the threats of the future. Beyond that, the right approach is to offer principles, try new ideas, learn, and adapt.

²¹Herb Kelleher, quoted in *The New Pioneers*, p. 181.

²²The desirability of CEOs focusing on strategy has long been recognized in management literature. Information technology makes such a focus more feasible.

²³See "How Jack Welch Runs GE."

²⁴"How Schwab Grabbed the Lion's Share," *Business Week Online*, June 22, 1998.

²⁵*The New Pioneers*, p. 162.

²⁶According to Jack Welch, a business's competitive advantage is based on exactly that. See "Taming the Info Monster," *Business Week Online*, June 22, 1998.

The United States is in an excellent position from which to do just that. True, like IBM in the 1980s, its motivation may be dulled by its recent victories and unrivaled strength. However, it has the economic, technological, and intellectual resources, as well as the time, to pursue different options. The current global security environment is sufficiently benign that the United States can risk investing in untried ideas.

Before importing lessons from the wider revolution, we should situate the U.S. defense establishment along the path of change. Clearly, it has assimilated many information systems, such as data processing, storage, and retrieval. (Legend has it, DoD was once the leader in data processing systems.) Presently, it is endeavoring to introduce systems that enhance knowledge, such as the Internet, universal data bases, distributed simulation, and decision support. This has been a struggle, but progress is being made.

However, the military establishment has not broadly instituted collaborative systems and processes that exploit information technology, such as networked teaming, exploratory planning, and boundaryless sharing of knowledge to solve problems. Such innovations require the most fundamental shift in the way institutions organize and work: *from top-down to outside-in*. There is ample evidence from other sectors that going this route improves both productivity (for operational advantage) and adaptability (for strategic advantage). Despite its uniqueness, the military can make similar advances.

Progress Made; Progress Lacking

In the capabilities and tactics of combat, the U.S. military is already implementing elements of transformation reminiscent of the wider revolution:

- The strategic exploitation of information technology is evident in the use of increasingly advanced C4ISR in the quest for common operational knowledge and seamless target tracking.
- Joint operating concepts are being developed to exploit the advantages of dispersed but integrated forces. These include standoff precision strike and, more experimentally, ground-force "swarm" tactics.
- The services are exploring new operational structures. The Navy's "network-centric warfare" is the fulfillment, thanks to data communications, of its traditional (and unavoidable) stress on coordination among dispersed and various platforms. The Army is planning to form brigade-sized rapidly deployable units capable of prevailing over slower, heavier enemy forces.

- Remote unmanned sensors and precision-guided munitions with off-board guidance are reducing the need to operate manned platforms in dangerous locations.

Yet, these innovations are hamstrung by the very DoD structures, processes, and authorities that are expected to fill the requirements for future forces. Although DoD is improving its efficiency, it is not making the investments and changes needed to solve military problems with the right mix of capabilities, operating concepts, and information, much less fostering even bolder solutions. In effect, it is making "back-office" but not "front-office" progress. Generally speaking—there are exceptions—it is still allocating resources, managing interservice relations, employing its human capital, and supporting its warfighters according to industrial-age operating and organizing principles.

Why Change?

The first impediment to transformation is that a compelling rationale for it has not been stated with sufficient zeal and vividness. Transformation is not a goal in itself, nor will organizations change solely to make better use of technology. It is not even enough to state that military transformation is needed so that the United States can be assured of the capability to project "rapid and decisive" force—the slogan du jour. *Why* is there a need to change, and what will happen if this need is not met?

In our view, the critical motivation for transformation is that the United States could otherwise find itself unable to protect its interests and meet its responsibilities in a world of hostile states with growing access to dangerous technologies. Why is this so?

U.S. engagement in the world demands the ability and will to project power decisively wherever and whenever needed. This is the central mission of the U.S. military, as is clear from its doctrine, capabilities, training, and spending priorities. As—not if—hostile countries (so-called rogues) obtain and threaten to use weapons of mass destruction (WMD) and other asymmetric responses to U.S. military superiority, American forces and citizens can become vulnerable. If these asymmetric threats are not neutralized, the United States could become a paper superpower—muscular but timid, superior but deterred. In a variety of ways, the military information revolution can help defeat these threats.

To illustrate, take the most alarming asymmetric threat: WMD in the hands of rogue states. For a decade or so, U.S. planners have recognized that failure to counter

this threat could undermine the U.S. military's central mission by weakening the country's ability or will to project power. Yet, even as the threat has grown, efforts to neutralize it have lagged.

At the same time, it is widely understood that information technology can improve the capabilities, doctrine, structure, and knowledge of U.S. forces to defeat this threat by:

- Providing an ability to spot, track, and strike mobile missile launchers
- Making it feasible to intercept WMD-bearing ballistic missiles through effective launch detection, target tracking and discrimination, and guidance
- Reducing the danger to U.S. intervention forces posed by WMD, to the extent that the forces are dispersed and maneuverable and have standoff precision-guided strike weapons.

Indeed, it is precisely because information technology can help counter WMD and other asymmetric threats that new operational concepts are being developed to exploit it. But prospects for timely implementation of these concepts will be bleak until DoD as a whole becomes more responsive. Fundamentally, the slow progress in generating the capabilities called for by U.S. strategy is due not to lack of technology but to lack of organizational responsiveness. In sum, the need to preserve the United States' ability to defend its interests depends on the transformation of not only U.S. forces but also the system that provides them.

With this as the strategic motivation—equivalent to, say, loss of market leadership or insolvency for a corporation—management of the defense establishment should emulate the successful formula of the wider revolution:

- Install an outside-in drive train
- Utilize talent and share knowledge across boundaries
- Provide relentless but trustful leadership.

Outside-In

The United States' joint warfighting commanders are often called end-users but are not in practice treated the way successful information-age corporations treat their end-users. By the time the defense establishment (military services; the Joint Staff; Office of the Secretary of Defense; programming, budgeting, and acquisition processes; congressional committees; and the defense industry) is finished, the capabilities provided bear faint resemblance to what warfighters need. Too many opportunities exist for

interpreting requirements to serve some parochial interest, such as pushing service capabilities. Moreover, operational commanders are viewed as knowing current but not future needs. And even to the extent that future problems are identified, the system tends to keep delivering what it is geared to deliver (as IBM was in the 1980s). In sum, DoD is structurally weak in defining and responding to future joint warfighting challenges.

Warfighting commanders think in terms of military problems to be solved, in much the same way that CEOs focus on business problems. Where the latter wrestle with manufacturing productivity and market distribution, the former confront the difficulty of finding and destroying enemy forces. As noted earlier, smart commercial end-users do not often waste time trying to determine the technical characteristics of the solutions they need. Instead, they state their problems in operational terms (e.g., reducing the cost of manufacturing a particular product) and allow consulting firms or systems integrators to work out the details of the solution. By the same token, joint warfighting commanders should express their problems in operational terms—e.g., suppressing enemy air defense or destroying mobile targets—and challenge the defense establishment to devise and furnish a solution.

For an outside-in process to work, the explication of such operational problems must not prejudice their solutions. Perhaps the concept of warfighting "requirements" ought to be jettisoned, in that it blurs the critical line between problem and solution. Commanders' problems must power the drive train, with the rest of DoD geared to finding and filling joint solutions, as opposed to vying over which service gets to satisfy which requirement.

Joint operational solutions should be integrated, flexible systems that include doctrine, capabilities, structures, and information. Although responsive to defined problems, they should also be robust across a wide range of plausible circumstances. They should be dynamic, because the problems they address will likely mutate as adversaries develop asymmetric responses. Thus, joint operational solutions should and can be durable and able to accommodate new technology, just as most modern information-based systems are. More than traditional military systems, they are likely to evolve rather than to be replaced.

The views of today's joint operational commanders should not be dismissed as irrelevant to tomorrow's problems. Many emerging asymmetric threats are representative of future challenges.²⁷ For example, the problem

²⁷See Davis, Bigelow, and McEver, *Analytical Methods for Studies and Experiments on "Transforming the Force."*

posed by enemy air defenses today will continue to evolve as the United States develops countermeasures and enemies respond with counter-countermeasures. Therefore, joint commanders need to report clearly the problems they anticipate having to solve the next time they are called upon to operate their forces.

Who should devise the solutions to these problems? Who should tell the military services what platforms, weapons, sensors, tactics, fighting units, and support they need to provide (the way systems integrators specify the assorted hardware, software, and services needed to solve a user's business problems)? Who should connect the drive train of accountability from the services to operational commanders?

The new Joint Forces Command (formerly the Atlantic Command) can and should help meet this need. Indeed, its very mission is to be the military's principal Joint Force "Trainer, Integrator, and Provider." In addition, the JFC has begun a series of joint experiments in order to determine what future capabilities the services may need to provide. To the extent that these prescribed joint forces match our concept of "operational solutions," this is on the right track. The Joint Forces Command should act as translator and system architect at the critical boundary between a military problem and its solution. (Likewise, the Strategic Forces Command and Space Command can play this role in solving the joint military problems within their scope.)

Both today and in the future, some operational problems are best solved by a single service. Finding and killing enemy submarines, for instance, can be left to the Navy. Airlift will be the Air Force's problem to solve. However, a growing number of critical problems, such as those caused by enemy possession of WMD, are best or only solved by joint capabilities, doctrine, and information: destroying mobile missile launchers; eliminating enemy air defense; halting an enemy army; and detecting, tracking and intercepting a ballistic missile attack. These are the problems that could leave the United States unable to project power—the problems that should inspire transformation. For them, the Joint Forces Command should be the force provider to the joint operational commanders, but in a special way.

This new command should not become just another stove-piped organization into which operational problems are fed and from which requirements are levied. The military services cannot be treated as mere subcontractors. After all, they provide the bulk of the value and knowledge in all solutions, not to mention a legislated responsibility to train and provide forces. The outside-in drive train must engage their talent. Moreover, each service

must determine what capabilities it must build by synthesizing its expected contributions across all operational solutions. With the possible exception of future C4ISR systems, capabilities will continue to originate with the services. So the relationship between the services and the Joint Forces Command must be collaborative.

Taking a page from the wider revolution, military operational problems should be solved by horizontal teams, quarterbacked by the Joint Forces Command.²⁸ These teams should stretch from the warfighting commands to the Joint Forces Command to the services to service-specific or DoD research and development labs to military schools to defense think tanks. The teams would find a solution to each problem and translate that solution into "specs" for needed capabilities and operating doctrines. As solutions are devised, they can be run up respective flagpoles and turned over to the existing budgeting, procurement, and program management systems. However, the teams would stay in place to energize bureaucracies, to keep sharing information, and to adapt solutions as the world changes and enemies respond.

Each team would be self-managed—the allegiance of its participants being not to their respective chains of command or services but to solving the problem with which they are charged. Teams would practice boundaryless knowledge-sharing and learning—no service secrets!—supported by collaborative information networks. In the words of a recent DoD working group report: "Structure is no longer associated with a fixed, functional, hierarchical wiring diagram (sic). Structure now is found by tracing the network communications, which are focused on a specific effort or center of responsibility."²⁹ Whether they are called centers of responsibility, joint solution teams, or some other buzz-term, the important idea is that these teams network across vertical jurisdictions and be insulated from vertical pressures in tackling emerging challenges of the battlefield.

Such a process would not obviate the need for a "corporate" budgeting system (akin to the current "PPBS") to make tradeoffs among needs, lock in investment and spending priorities, and obtain financing. Of course, a budgeting system cannot devise military solutions; nor would our lateral process for finding solutions fix budget priorities across DoD as a whole. The corporate analog is the distinction, and perpendicular fit, between vertical business planning and horizontal value-added operations.

²⁸Such teams would be not unlike the "concept option groups" suggested in earlier RAND work. See John Birkler, C. Richard Neu, and Glenn Kent, *Gaining New Military Capability: An Experiment in Concept Development*, MR-912-OSD (Santa Monica: RAND, 1998).

²⁹Strategic Studies Defense Group III, *1998 Final Report: Capitalizing on the Network* (Washington, D.C.: U.S. Department of Defense) p. 7.

In sum, the outside-in drive train can work only if a joint force provider, or solution integrator, answers to the operational commanders and can in turn specify what capabilities are needed from the services. This integrator should not, and realistically cannot, be a czar, but instead should be the sponsor and rapporteur of networked teams dedicated to solving problems. Such horizontal mechanisms are already beginning to spring up, in the form of "integrated product teams" (IPTs) and embryonic solution teams initiated by the Joint Forces Command. However, they need to have the best talent openly sharing the best information—and they need encouragement and protection from the highest levels.

Talent Without Boundaries

A major difficulty in transforming DoD is that each military service tries to maximize its importance, largely at the expense of the other services. This is not only standard bureaucratic behavior but also common among competing business units within corporations, even those that have gone through a transformation. Such competition is not all bad: It keeps pressure on the services to manage resources economically and to produce useful capabilities. Moreover, interservice rivalry does not preclude better learning within each service, based on its own dissemination of knowledge, germination of ideas, and tolerance of risk. The services have, in fact, begun to improve their internal knowledge-sharing to varying degrees.

Yet, DoD as a whole cannot be an organization of boundaryless knowledge as long as walls separate the services from each other and from the outside world. While it is exceedingly difficult—if not impossible—to tear down these walls completely, they can be made more porous. This will not happen by edict from the top or be inspired by the vague cause of "jointness." Rather, the key is to promote a unifying interest in military operations and in solving operational challenges, the most daunting and exciting of which are indisputably joint. This would facilitate more of an outside-in orientation within the services, and it would blend the service orientation of each individual with a dedication to learning and improving operational performance.

New technology can facilitate this shift of attention. For example, if all members of a team formed to tackle a particular joint operational problem (as described above) were networked for the purpose of sharing analyses and ideas on that problem, it would create a focal point, maybe even an esprit, separate from vertical interests. Each participant would bring a special perspective and expertise, and all would learn for the sake of fashioning a result. Thus, teams formed to create the outside-in drive train would also engender, and demand, lateral sharing of knowledge.

Joint operational solution teams/networks would not be new organization-chart entities. On the contrary, they would crisscross the bureaucracy, focusing interest, spreading information, and honing individual and collective talent to face the fluid challenges of the outside world. If such networks sound potentially disorderly, disruptive, and even a bit subversive, they should. The loyalties of the participants, at least while on their team's intranet, should be devoted to the common goal of defeating a problem that transcends service boundaries.

Because the United States' all-volunteer military has exceptional human capital, efforts to develop and harness the talent of its individuals should pay enormous dividends. Its unrivaled system of professional military education should intensify efforts to place more emphasis on learning "the operational art." The spread of information technology does not require that users devote ever greater attention to understanding the technology itself. Rather, it can enable users to think more freely and creatively about how to operate better. Learning can be shifted from technology and equipment to doctrine and structure. Stressing operational arts in education is also a way to get U.S. officers to worry less about hierarchical agendas and more about military outcomes.

In parallel, DoD should see to it that its people learn about successful transformations occurring in other sectors. More imaginative use of exchange programs would enable military officers to study how outside-in organizations respond to immediate opportunities and adapt to changing conditions. A few months at, say, Amazon.com would teach an officer nothing about warfare, but it would give him or her a sense of how both individuals and organizations can focus their attention on external demands.

Leadership Without Control

Transforming an organization to exploit information technology requires opening it up: externally, so that it can be more responsive and adaptive; internally, so that its people can better develop and use their talent. What makes this such a challenge is that it takes leaders who are purposeful but not controlling, impatient but not intrusive, confident and trusting but not blasé.

As difficult as this is in industry, it is even more challenging in public institutions with political, legal, and regulatory constraints, and with fewer carrots and sticks.³⁰ DoD cannot be reorganized or take major initiatives without the

³⁰For a discussion of the political constraints to transforming the DoD, see Francis Fukuyama and Abram N. Shulsky, "Military Organization in the Information Age: Lessons from the World of Business," in Zalmay M. Khalilzad and John P. White, eds., *The Changing Role of Information Warfare* (Santa Monica: RAND, 1999), pp. 327–360.

scrutiny and consent of a Congress that makes even the most active board of directors seem passive. The military services and their procurement programs have powerful political constituencies, which also happen to control defense spending. But it is precisely because effecting change is so difficult in a public institution like DoD that the quality of leadership provided is so crucial.

A military establishment aligned horizontally to solve joint operational military problems does not need guidance from on high. Yet, without the right sort of leadership, the conditions permitting such alignment could not be attained in the first place. So other than "letting go," what should leadership provide?

First, top leaders must explain why it is so important for the organization to overhaul its way of working in order to exploit information technology. In DoD's case, the compelling need is that the United States could otherwise find itself unable to protect its interests and meet its responsibilities at acceptable costs and risks, especially because of WMD and other asymmetric threats that information technology can counter. The motivation required to change a corporation's course must be corporate-wide. In the case of DoD, this means that no less than a national security interest, vividly communicated, will do as the reason for change. Leaders are indispensable in explaining this.

Second, leaders must align organizational responsibilities with the objective of being more responsive and adaptable, even if this means weakening vertical management. For example, General Electric's Jack Welch instructs his managers to "hate bureaucracy and all the nonsense that comes with it."³¹ However, the shift from top-down to outside-in is more than antibureaucratic. It says, in effect, let external demands not internal management guide your productive endeavors.

Top DoD civilian and military leaders can do this by relating the outside-in reorientation to the fundamental need for change: *explaining why particular operational military problems must be solved if the United States is to remain able to protect its interests*. Such a role tracks with the recommendation of earlier RAND work that the Secretary of Defense periodically challenge the U.S. military to solve—in reality, not on vu-graphs—those campaign-level problems on which could hinge the success of a response to aggression.³² Such a challenge would set the framework for joint warfighting commanders to specify the operational problems in need of solutions.

DoD leaders can also foster a solution-driven orientation by encouraging and sheltering horizontal initiatives such as the joint operational solution teams mentioned above, as well as the role of the Joint Forces Command in sponsoring such teams. They should insist that participants in these teams be among the services' brightest thinkers and that they be given no higher priority than to solve the problem at hand with their colleagues.

Third, DoD leaders must emulate Welch's assault on barriers to developing and using human talent. In the words of a DoD working group: "In preparing for the future, the single most valuable contribution of the current leadership is to build a learning organization which is devoted to increasing the effectiveness of initiative and ingenuity of commanders and highly skilled employment teams—in effect, to put into motion a mechanism of continuous improvement. . . ."³³ To some extent, this can be done by fostering professional education focused on military operational arts. Equally important, leaders can create a climate of intellectual ferment, debate, and iconoclasm, aimed at improving the ability of the U.S. military to perform effectively in a more difficult and dangerous future.

CONCLUSIONS

Jack Welch has instructed GE's operating units to "destroy your business," by which he probably means "disestablish your business and build one that could out-compete your current one." The U.S. defense establishment could stand some *disestablishing*.

The United States' armed forces are embarking on a military information revolution. Yet, paradoxically, DoD is impeding transformation. Dramatic improvements in operational performance promised by information technology are being retarded by an organization that is accustomed to using the capabilities it produces, and to producing those capabilities, in its well-worn way. The current defense establishment does not yet resemble the general model of organizations that have successfully transformed themselves to take maximum advantage of information technology.

Some readers may not agree with our particular version of the changes in military doctrine and capabilities made possible by information technology; they may even disagree with us about the strategic need to make such changes. However, they could hardly argue that general management approaches found to be so widely successful in industry have no place in defining and producing mili-

³¹ "GE's General Earns Another Star," *The Washington Post*, November 3, 1999, p. E1. See also "The Ultimate Manager," *Fortune*, November 22, 1999, p. 185-189.

³² See *Transforming the Force*.

³³ *Capitalizing on the Network*, p. vii.

tary capabilities. If nothing else, the breathtaking productivity gains that the information revolution is now yielding in the "new" U.S. economy cannot be dismissed as irrelevant by analysts and stewards of national defense.³⁴ The general principles that emerge from our look at commercial experience—outside-in, boundaryless knowledge, and noncontrolling leadership—cannot but help DoD.

Transformation can and will take many specific paths, some successful and some not. In this spirit, we have suggested several steps, especially stressing one aimed at making DoD more responsive to external demands by aligning its talent across its bureaucratic grain in order to solve operational problems. This would take the form of teams led by officers from the Joint Forces Command and including persons—not representatives!—from the services and other organizations. Ideally, a team should exist to solve each of the operational problems critical to the ability of the United States to project force wherever and

whenever needed, despite the presence of WMD and other asymmetric threats. The teams should be given all the information, freedom, and protection they need.

Variants of this idea of joint operational solution teams have been in the air in recent years. Before the creation of the Joint Forces Command, it was not clear how they would be operationalized; attempts to develop joint solutions through negotiated studies have foundered on interservice posturing. Importantly, the Joint Service Command is now establishing a set of priority military challenges and organizing talent in a fashion similar to these teams. However, the teams must have a mandate; their composition must stretch from warfighters to researchers; their results must have integrity and a presumption of acceptance; and their members must be treated as heroes, not lepers, by their bureaucratic and service homes. Otherwise they will fail. Only DoD's top leaders can see to it that they succeed.

³⁴For evidence of the real and dramatic effect that information technology is having on the U.S. economy, see "How Fast Can This Hot-Rod Go?" *Business Week*, November 29, 1999, pp. 40–42; and William A. Sahlman, "The New Economy is Stronger Than You Think," *Harvard Business Review*, November–December 1999, pp. 99–116.

RAND is a nonprofit institution that helps improve policy and decisionmaking through research and analysis. Results of specific studies are documented in other RAND publications and in professional journal articles and books. To obtain information about RAND studies or to order documents, contact Distribution Services (Telephone: 310-451-7002; FAX: 310-451-6915; or Internet: order@rand.org). Abstracts of all RAND documents may be viewed on the World Wide Web (<http://www.rand.org>). RAND® is a registered trademark.

RAND

1700 Main Street, P.O. Box 2138, Santa Monica, California 90407-2138 • Telephone 310-393-0411 • FAX 310-393-4818
1333 H St., N.W., Washington, D.C. 20005-4707 • Telephone 202-296-5000 • FAX 202-296-7960